

Amendment and Response

Applicant: Daniel D. Baker

Serial No.: 10/627,431

Filed: July 25, 2003

Docket No.: 58912US002

Title: APPARATUS AND METHOD FOR HANDLING LINERLESS LABEL TAPE

IN THE SPECIFICATION

Please replace the paragraph beginning at page 6, line 16, with the following re-written paragraph:

In one preferred embodiment of the above apparatus, the apparatus ~~of~~ further comprises a belt connecting the driven roller and the driven platen roller, and a first drive motor for rotating either the platen roller or the driven roller. In another preferred embodiment of the above apparatus, the apparatus further comprises a first drive motor for rotating the driven platen roller and a second drive motor for rotating the driven roller. In one aspect of this embodiment, the first drive motor rotates the platen roller a first surface speed, where the second surface speed is greater than or equal to the first surface speed. In another aspect of this embodiment, when the printer is printing, the first drive motor rotates the platen roller and the second drive motor does not rotate the driven roller, and ~~where~~ when the printer is not printing, the first drive motor does not rotate the ~~drive motor~~ platen roller and the second drive motor rotates the driven roller. In yet another aspect of this embodiment, after the printer stops printing, the print head moves away from the platen roller.

Please replace the paragraph beginning at page 13, line 26, with the following re-written paragraph:

The print apparatus 60 is of a type known in the art, and preferably includes the print head 70 electrically connected to a controller (not shown). Based on input, the controller controls the print head 70 to print desired indicia (e.g., alphanumeric, bar codes, images, logos, other printed information, etc.) on the print side 18 of the linerless tape 16. In one preferred embodiment, the print apparatus 60 is a thermal transfer printer, such as model 110PAX3 from Zebra Corporation (Vernon Hills, Illinois) or a similar printer or print engine with or without modification and includes a ribbon 66, a ribbon supply holder or roller 62, one or more ribbon guides 68a, 68b, and ribbon take-up roller 72. The ribbon 66 can be supplied in roll-form as a

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roll 64. The ribbon 66 extends from the supply roller 62 about the first ribbon guide 68a, print head 70, the second ribbon guide 68b, and to the take-up roller 72. Thus, the ribbon 66 is directed between the print head 70 and the linerless tape 16 for effectuating printing by the print head 70 on the linerless tape 16. Alternatively, the print apparatus can assume other forms known in the art. For example, the print apparatus 60 can be an ink jet printer, such that the print head 70 is an ink jet print head. Alternatively, direct thermal, impact, or other print systems are equally applicable.

Please replace the paragraph beginning at page 15, line 8, with the following re-written paragraph:

Preferably, the platen roller 36 and the driven roller 38 include a belt 40 connecting them together. In one preferred embodiment, the platen roller 36 includes its own drive motor (not shown), which is operatively connected with the print apparatus 60. When the controller causes the print head 70 of the print apparatus 60 to start printing, the controller likewise sends a signal to the drive motor to start rotating the platen roller 36. In this embodiment, the driven roller 38 does not include its own drive motor. Instead, the driven roller 38 is rotated or driven indirectly by the drive motor connected to the platen roller 36 by use of the belt 40 connecting the platen roller 36 and the drive roller 38. The belt 40 advantageously drives the driven roller 38 at the same speed of the platen roller 36. More preferably, the diameter of the platen roller 36 is less than or equal to the diameter of the driven roller 38 because this allows the driven roller 38 to be driven at a slightly greater surface speed of the platen roller 36. This preferred operational characteristic assists in establishing and maintaining the desired tension or positive pull on the linerless tape 16 as it extends from the platen roller 36 because this allows the tape to be pulled from the platen roller 36 at a faster rate than the platen roller 36 is rotating. In addition, this preferred operational characteristic ensures a positive pull or tension on the linerless tape 16 that prevents the linerless tape 16 from “slipping back” and wrapping about the platen roller 36 beyond the desired wrap position previously described.

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Please replace the paragraph beginning at page 16, line 7, with the following re-written paragraph:

In yet another alternative embodiment, the apparatus 10 could not include a belt 40. Instead, the platen roller 36 and the driven roller 38 could each include their own separate and independent drive motors. In this embodiment, when the controller sends a signal to the print head 70 to start printing, the controller also sends signals to both the drive motors to each start rotating or driving the platen roller 36 and ~~drive~~ the driven roller 38. Similarly, in this embodiment, the discussion above about relative diameters and surface speeds of the platen roller 36 and the driven roller 38 equally applies to obtain the preferred operational characteristic assists of establishing and maintaining the desired tension or positive pull on the linerless tape 16 as it extends from the platen roller 36.

Please replace the paragraph beginning at page 16, line 16, with the following re-written paragraph:

In yet another alternative embodiment, the apparatus would not include a belt 40. Instead, only the driven roller 38 would be driven, for example by its own drive motor. A motor would not drive the platen roller 36, either directly or indirectly. Instead, the platen roller 36 would be an idle guide roller, which freely rotates as the linerless tape 16 moved past it. In this embodiment, the ~~drive~~ driven roller 38 pulls the tape 16 past the print head 70 along the platen roller 36 and pulls the ~~tape 16~~ tape 16 from the platen roller 36. This configuration is advantageous because it separates the drive function from the platen roller 36 and allows it to become an idle roller, which moves easily with the tape 16 as it travels along the tape path. With other prior printing apparatuses in the art, the platen roller 36 typically becomes worn over time because it is pulling or rubbing against the adhesive side 20 of the tape 16. As the platen roller 36 becomes worn, the non-stick coating, or the outside of the platen roller 36, such as silicone, begins to wear off and the tape starts sticking to the platen roller 36. With the apparatus 10 as described above, the surface characteristics of the platen roller 36 are not as critical because the

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~~drive~~-driven roller 38 pulls the tape 16 reliably from the platen roller 36, resulting in longer life of the platen roller 36.

Please replace the paragraph beginning at page 17, line 3, with the following re-written paragraph:

Preferably, the platen roller 36 and the driven roller 38 each include a one-way clutch bearing, which is known in the art. In particular, it is advantageous to have the one-way clutch bearing in the platen roller 36 so that the drive motor connected to the platen roller 36 only provides drive when the surface speed of the platen roller 36 is equal to or less than the surface speed of the driven roller 38.

Please replace the paragraph beginning at page 17, line 14, with the following re-written paragraph:

In general terms, the apparatus 100 includes a web of linerless tape 16, a tape supply holder or roller 12, an idle guide roller 126, a prestrip driven roller 128, a first dancer arm 26, a platen roller 136, a print apparatus 60, a driven roller 138, a festoon 140 made of a series of dancer arms 144144a and 144b, idle guide rollers 146, 148, and 150, an applicator roller 152, a cutter (not shown), and a housing 111 maintaining all of the components. The majority of the same components are described in greater detail above in respect to apparatus 10 in Figures 1-2. In general terms, however, the web of linerless tape 16 is initially provided as a roll 14 otherwise supported by the tape supply holder 12. The prestrip driven roller 128 is driven by a motor (not shown) and assists in prestripping the tape 16 from the tape supply roll 14. The guide rollers 126 and the dancer arm 26 direct the web of linerless tape 16 to the platen roller 136, which in turn guides the web of linerless tape 16 past the print head 70 for printing thereon. The driven roller 138 pulls the web of linerless tape 16 from the platen roller 136 and directs it to the festoon 140 of dancer arms 144a and 144b, past idle guide roller 146 and 148. A series of guide idle rollers 150 direct the linerless tape 16 to the applicator roller 152, where it subsequently applies the tape

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to the article 5, preferably a box. Alternatively, the apparatus 100 may include an applicator 80 and cutter 90, similar to that described above in regard to apparatus 10, and to cut and apply the linerless tape to the ~~box~~article 5.

Please replace the paragraph beginning at page 18, line 1, with the following re-written paragraph:

The print apparatus 60 preferably includes the print head 70 electrically connected to a controller (not shown). Based on input, the controller controls the print head 70 to print desired indicia (e.g., alphanumeric, bar codes, images, logos, other printed information, etc.) on the print side 18 of the linerless tape 16. In one preferred embodiment, the print apparatus 60 is a thermal transfer printer, such as model PE4X from Datamax Corporation (Orlando, Florida) or a similar printer or print engine with or without modification and includes a ribbon 66 that can be supplied in the form of a roll 64, a ribbon supply holder or roller 62, and a ribbon take-up roller 72. The ribbon 66 extends from the supply roller 62 about print head 70, and to the take-up roller 72. Thus, the ribbon 66 is directed between the print head 70 and the linerless tape 16 for effectuating printing by the print head 70 on the linerless tape 16. Alternatively, the print apparatus can assume other forms known in the art. For example, the print apparatus 60 can be an ink jet printer, such that the print head 70 is an ink jet print head. Alternatively, direct thermal, impact, or other print systems are equally applicable.

Please replace the paragraph beginning at page 18, line 15, with the following re-written paragraph:

The relationship and operation of the driven roller 138 relative to the platen roller 136 of apparatus 100 is shown more clearly by the enlarged, side view of Figure 4. The driven roller 138 operates to pull the linerless tape 16 from the platen roller 136. In the view of Figure 4, wrap angle α reflects the angle around the driven roller 138 between where the linerless tape first contacts the driven roller 138 and where the linerless tape leaves the driven roller 138 towards

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the dancer arm ~~144~~ 144a in the festoon 140. With this starting point in mind, the driven roller 138 is positioned relative to the platen roller 136 to allow the linerless tape 16 to partially wrap about the driven roller 136. This wrap angle α of the web of linerless tape 16 along the driven roller 138 is preferably between $10^\circ - 180^\circ$. More preferably, wrap angle α of the web of linerless tape 16 along the driven roller 38 is between $45^\circ - 135^\circ$, and most preferably 90° . This preferred wrap angle promotes a positive pull or tension on the linerless tape 16 from the platen roller 36. Alternatively, other wrap angles are also acceptable, either greater or lesser.

Please replace the paragraph beginning at page 19, line 4, with the following re-written paragraph:

In one preferred embodiment, when the controller causes the print head 70 of the print apparatus 60 to start printing, the controller likewise sends a signal to the independent drive motors to start rotating the platen roller 136 and ~~drive the driven~~ roller 138. In an alternative preferred embodiment, when the controller causes the print head 70 of the print apparatus 60 to start printing, the controller only sends a signal to the drive motor to start rotating the platen roller 136. While the print head 70 is printing, the drive motor connected to the driven roller 138 does not operate. Instead, the driven roller 138 will be idle. The linerless tape will continue to travel along the tape path due to the tension created by the dancer arm and the applicator 80 as the tape 16 is applied to the box 5. In one preferred embodiment, both the platen roller ~~36~~ 136 and the driven roller ~~38~~ 138 include one-way clutch bearings ~~known~~ known in the art. However, when the print head 70 is done printing, the print head 70 will rotate away from the platen roller ~~138~~ 136 (as illustrated in dotted lines) to be out of contact with the platen roller 136. Then, the drive motor attached to the driven roller 138 will start rotating the driven roller 138 at a high speed and the drive motor attached to the platen roller 136 will turn off, thus, making the platen roller 136 an idle roller. This configuration is advantageous in that it allows linerless tape 16 to freely pass by the print apparatus 60 when the print head 70 is not printing.

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Please replace the paragraph beginning at page 19, line 21, with the following re-written paragraph:

In yet another preferred embodiment, the platen roller 136 may not have a drive motor connected to it either directly or indirectly. Instead, only the ~~drive-driven~~ roller 138 has a drive motor connected to it. In this embodiment, the ~~drive-driven~~ roller 138 pulls the tape 16 past the print head 70 along the platen roller ~~36-136~~ and pulls the tape 16 from the platen roller ~~36-136~~. In this embodiment, the discussion above about the advantages of separating the drive function from the platen roller 36 equally applies to obtain longer platen roller life.